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PSYCHOLOGICAL LITERATURE.

I.—NEUROLOGICAL.

Studien über Klinik und Pathologie der Idiotie nebst Untersuchungen über die normale Anatomie der Hirnrinde. CARL HAMMARBERG. Pp. 126, VII plates, 49 figs. K. F. Köhler, Leipzig. (Translated from the Swedish after the author's death by Walter Berger and published by Prof. S. E. Henschen.)

After all the preliminary weighing and measuring, speculating on ventricles and *spiritus animalis*, on *corpora callosa*, pineal bodies and souls, after all the fumbling with "bumps," measuring of lobes and tracing out of convolutions, this research really clinches with the problem of the correlation of mental and cerebral differences. Still all the other work has led up to this, and the researches of Kaes on the comparative medullation of the brain approaches it very closely. Flechsig has shown that in general no tract of fibers begins to function until the sheaths become medullated, so that the number of medullated fibers must be looked upon as an index to the complexity of functioning pathways in the central nervous system. But, important as the medullated fiber is, it arises in the main from a nerve cell, or, speaking more exactly, is only one part of a nerve cell, the most essential part, it may be, from the side of nervous conduction. The fiber arises from and draws for its sustenance upon the cell body. Hence the study which approaches nearest the core and source of all things physical in the brain must deal with the body of the nerve cell, as does this investigation of Hammarberg's.

The author's purpose is practically to compare a series of human brains as to number, size and character of processes of cells, and he must first settle upon a method which will insure reliable results. To this end he examines brains in the fresh state, and compares specimens so obtained with portions of the same brain prepared by various histological methods. Although hardening in alcohol is found to produce a shrinkage of twenty per cent., this seems to be uniform as between different brains, and no further variations occur during the other processes of embedding in paraffine, sectioning and staining. He therefore adopts this method of hardening and sectioning, and stains in methyl blue. Having sections of uniform thickness he next proceeds to count the cells in a 0.1 mm. cube, making this number the basis of his comparison. Here we seek in vain for figures which give exactly the numbers of cells in comparable regions of the brain for the author's entire series. We are told merely that for normal brains for the same areas the counts correspond, and for abnormal brains the method gave constant and comparable results. (*Constante und mit einander völlig vergleichbare Resultate liefert.*)

Hammarberg next passes, in Section II, to the critical description, region by region, of his normal material, consisting of twelve human brains ranging in age from a five months embryo to fifty years. This is prefaced by a discussion of the types of cortical lamination of the authors. He does not in the main subscribe to the usually described types, but says "*im Grossen und Ganzen*" that a motor and sensory type of cortex is fairly indicated. The motor cortex is characterized by the almost complete absence of the fourth layer, its place being usurped, as it were, by the layer of large pyramidal cells. The sensory type is distinguished by a clearly defined fourth layer, with a layer of large pyramids between it and the fifth layer. The author lays no emphasis on even this distinction, final appeal being not to types of arrangement, but to the actual specimens from the different regions of the cortex.

Beginning with the frontal region, the author discusses each important gyrus in a way to cover practically the entire cortex. In his first twelve figures he gives us camera drawings of every cell *in situ* under a magnification of 200 diameters for twelve typical locations in a normal brain. We also have supplied among the figures of normal material single cells of each type drawn in detail under a higher magnification. In the text is stated the exact number of cells in the different layers of each region, and in each figure is given the size of the characteristic cells. The number of cells in a cubic 0.1 mm. is generally from ten to twenty, but may vary from five or six to even as many as ninety.

The third section of the paper consists in a similar analysis of nine defective brains. According to Ziemssen's classification cases I to IV are idiotic (conception and consciousness absent, with impossibility of psychic development). Cases V and VI are low grade imbecile, and VII, VIII and IX are medium to high grade imbeciles. The cases range in age from twenty-two months to twenty-six years. Hammarberg's method of treating a case may best be outlined by following one of the cases through.

Case II, aged fourteen years, hospital record from June 30, 1887, to date of death from acute pneumonia February 28, 1889. Nothing is known as to heredity. Patient has received no wounds, and has never had the usual diseases of children. Idiocy was noticed very early from the fact that the patient showed no signs of attention to anything that went on about her. She never learned to sit or walk or to grasp anything. Then follows a physician's examination of the case, psychological and anthropological as well as medical, made in 1886. The patient is of normal height for her age, but bedridden, and has not the slightest ability to help herself in any way, except to cry when hungry; all traces of speech, recognition of things or persons totally wanting. Each of the cranial nerves is next tested. I, concerning olfactory sensations, nothing is known. II, III, IV, VI give evidence of normal function by movements of the eyes and pupil. V, is functional, as evidenced by sensation in the face region. VII, not parietic. VIII, hearing comparatively acute. IX, nothing is known as to taste. X, XI, XII show no abnormal reactions. Sensibility seems to be normal over the whole body. On the motor side there is paresis of the upper and paralysis of the lower extremities. Reflexes are strong. There are no marked contractures. The muscles of the face and fingers twitch at times and clonic spasms also occur, lasting for a few minutes and being followed by sleep. Condition of patient remains unaltered during the twenty months of hospital life.

From results of autopsy we learn that the dura was adherent, the

sutures of the skull were not closed, the ventricles enlarged and full of fluid, that the brain hardened, weighed 442 grammes, and that the hemispheres were unsymmetrical, the right weighing 138, the left 218 grammes. We are disappointed in not finding data as to size and condition of blood vessels, as to body weight and stature, and as to the fresh weight of the brain. Several pages follow giving the gross anatomy of each region and part of the brain, and five figures showing different views are sufficient to render the explanations clear. Among other things, the insula is lacking or represented by two accessory frontal gyri on the surface, the corpus callosum is membranous and the fornix is defective, a number of important sulci are not represented and considerable areas are unconvoluted. Cerebellum, which is frequently small in such cases, together with the basal ganglia, shows no abnormality. Though the cerebellum is symmetrical, the pons is asymmetrical, following the cerebrum in this respect. The microscopical examination extends likewise to all parts of the brain and is supplemented by several figures in the plates. Instead of the normal number of cells, we find two, three or four, never more than ten, to the cubic 0.1 mm., and the figures show, instead of the large well-developed cells of the normal brain, slender spindles or granules. The cortex consists in several regions of but a single layer of embryonic cells, with no trace of the ordinary differentiation. In other parts it is two layered, a superficial layer of cells partially grown into the pyramidal shape and a deeper layer of simple spindle-shaped cells.

The discussion of each case is closed by an *Epikrise*, in which all the clinical symptoms are balanced in review with all the pathological findings, and a *Diagnose* giving the author's explanations. With this case the total absence of all psychic functions can not be attributed to any or all of the gross findings, microcephalus, asymmetry of hemispheres, absence of corpus callosum, etc. It can be explained only by the condition of the cortical elements. For large areas these have not developed beyond the sixth month of fetal life; in others they have apparently ceased growing during the eighth month, and only in one limited area, the hippocampal, have the cells assumed the adult form, though even here in point of number and size they fall far below the normal. Up to the sixth month, then, development appears to have been normal, and at this time something occurred, (the author is not able to say what, in this case or in any of his others) which stopped growth in large regions of the cortex and greatly hindered it in the rest. The case is one of arrested development, and in this fact all the sensory, motor and psychic symptoms find their complete explanation.

This will serve as a type both as to character of findings and manner of treatment. In general an arrest of development is diagnosed. In one case, however, active degeneration processes have complicated the usual course of arrest. Several of the imbeciles approach the normal somewhat closely, but in all cases by the author's methods no difficulty is encountered in demonstrating abnormalities in the cortex, in the number, size or type of the cells, and these serve to explain the psychic condition.

In arrangement of matter in the text, the paper leaves much to be desired. No one can read it without feeling that the material has not been utilized to the full, and while the strictly logical arrangement is followed for each case, a logical presentation of the results of the whole group is sadly lacking. No tables are given, and to compare the data of size and number of cells in the different brains, the reader is compelled to hunt through the scattered notes of all

the individual cases. However, these are trivial matters compared with the greatness of the labor and the value of the work. The author died suddenly in the full vigor of opening manhood and in the midst of his great work, one of his last requests being that his work be published in one of the world's great languages. To this sad fact must be attributed the shortcomings in the text.

No such criticism can attach to the plates, most of which bear the legend, "C. Hammarberg del." These certainly constitute one of the great contributions to neurological science. So conscientiously has this work been done that the observer seems to be looking at the very cells of the brains of the normal men and idiots and imbeciles. In one class he sees the rich development of the cortical elements and compares this with the stunted growth in the defectives. Nothing could be clearer and more convincing than this comparison, and nothing could more forcibly present the all important question: What are the causes of the differences observed and what the essential conditions which have favored growth in the one instance and arrested it in the other?

C. F. H.

Contributions to the Structure and Development of the Vertebrate Head.

WM. A. LOCY. *Journal of Morphology*, XI, 497-594, Plates XXVI-XXX, 11 cuts in text, 124 Figs. Boston, 1896.

Since Oken and Goethe first outlined the theory that the vertebrate head represented a number of coalesced and modified vertebræ with their contents and appendages, the subject has attracted attention as one likely to throw some light on the ancestry of the vertebrate phylum. Owen's work was directed largely toward the skull, with the idea that the bones furnished the most trustworthy outlines of segmentation; now these are considered as "external features, of no segmental importance whatsoever." Huxley, with his usual keen insight, turned the discussion toward organs of real segmental importance, the cranial nerves and gill clefts. And again with Balfour's classical work, attention turned toward the mesoblastic somites, of which he clearly identified eight in the region of the head. On the strength of Balfour's work chiefly, the tendency has prevailed among embryologists to consider the mesoblastic segments the primary divisions to which the nervous axis has come secondarily to conform. This is the view quite generally expressed in the various vertebrate embryologies. Thus the nervous system is moulded by its environment mechanically, as it were, and at the outset must therefore waive its claim to being the "master organ" of the body. It is thus seen to be of considerable psychological and physiological importance that Locy brings out the fact that the first traces of segmentation appear in the neural plate and not in the mesoblast, and thus the nervous system assumes its position from the first.

In three former papers (reviewed in this JOURNAL, VI, 448), Locy states the main fact, viz., that he finds eleven neural segments clearly outlined in the expanded portion of the neural plate in one of the sharks, in *Amblystoma Diemyctylus* and in *Torpedo ocellata*. The present paper marshals all the facts which the author has been able to gather, and presents them in the clearest possible form, and lavishly illustrated. The chick and frog are also found to have the same number of head segments, though very obscure in the frog. In the chick they may be observed as soon as the neural folds are formed, and for some time after the mesoblastic somites begin to develop. That they are not artefacts is witnessed by the